

M I C H I G A N F O R E S T P E S T

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COOPERATING AGENCIES

U.S. Bureau of Entomology and Plant Quarantine,
State Department of Agriculture, Michigan State College,
University of Michigan, U.S. Forest Service,
and Michigan Department of Conservation

MICHIGAN FOREST PEST DETECTION PROGRAM

REPORT FOR 1951

Introduction

The Michigan Forest Pest Detection Program was organized in the spring of 1950 through the cooperative efforts of several state and federal agencies. While much progress has been made during the first two years of operation, considerable ground work still remains to be done before the program will be expanded to a point where it can be said to be in "full swing."

The goal of this program is a coordinated approach to the problem of forest insects and diseases on a statewide basis, employing the facilities of the various cooperating agencies, each contributing in its respective field. The participating agencies are the U. S. Bureau of Entomology and Plant Quarantine, the Bureau of Plant Industry of the State Department of Agriculture, the Departments of Entomology and Plant Pathology of Michigan State College, the School of Natural Resources of the University of Michigan, the U. S. Forest Service, and the Forestry Division of the Department of Conservation.

The following report of activities of the Forest Pest Detection Program for 1951 was compiled by the Forestry Division of the Department of Conservation.

1951 ACTIVITIES

MEETINGS

Madison, Wisconsin

On April 25, 14 representatives from Minnesota, Wisconsin, and Michigan met at Madison, Wisconsin, to discuss mutual insect problems and survey methods, and the feasibility of a coordinated system of reporting for the Lake States area. Chairman of the meeting was R. D. Shenefelt of the University of Wisconsin, Department of Entomology.

It was found that the three states represented all had recently begun forest pest programs, but that none had yet had ample time to test its own system thoroughly. It was decided, therefore, to postpone attempts at an integrated program until each state had worked out its own procedure.

Many suggestions of mutual interest came from the meeting, and the general feeling was that since the objectives in each state were essentially the same, the need for uniformity of survey methods and reporting was not imperative. Each state agreed to send the others copies of its reports and other material which might be of interest. It was further agreed that a similar meeting should be held in Milwaukee early in 1952.

Escanaba

On June 13 a meeting was held in Escanaba for the purpose of presenting the Forest Pest Detection Program to private industrial foresters and to invite their cooperation. Norman Smith was Chairman of the meeting which was attended by 30 persons, 16 of whom represented lumber and pulp and paper companies. Many of these companies have large areas of timber types susceptible to insect and disease attacks, and several have established plantations or are contemplating planting projects.

Following a discussion of the program and the method of reporting, S. A. Graham, W. F. Morofsky, D. M. Benjamin, and F. E. Webb presented brief talks, with slides, on the critical insects occurring in the area. Special guests at the meeting were Drs. M. L. Prebble and B. M. McGugan of the Canadian Forest Insect Laboratory, Sault Ste. Marie, Ontario, who outlined some of the work being done in Canada.

The group went into the field in the afternoon to examine larch case-bearer and budworm areas, and to discuss the filling out of the report form. The industrial foresters indicated an interest in reporting on the form or by letter, observations of insect conditions on their lands, and a desire to cooperate in any way possible.

SPECIAL SURVEYS

Jack Pine Budworm

On August 1, 1951, two flights were made in a Department of Conservation plane with personnel of the Forestry Division and Bureau of Entomology and Plant Quarantine to observe the budworm area. Starting from Roscommon the first flight went east along the common boundary of the Huron National and Ogemaw State Forests to highway M-33, north across the Huron Forest to Mio, west over the Au Sable River to the Kalkaska-Crawford county line and back to Roscommon. The second flight went from Roscommon to Atlanta, and north over the jack pine areas of Montmorency county and back.

An attempt was made to classify jack pine areas within the infestation according to intensity of defoliation based on color as observed from the air. Green foliage indicated light or no infestation, brownish-green (more green than brown) to brown indicated heavy infestation. County maps were held in the laps of three observers who attempted to record the

changes in degree of infestation.

The method did not prove entirely satisfactory due to difficulty in detecting changes from one intensity to another which were very gradual, and also due to inability to determine the exact location of the plane at all times. In spite of these handicaps there was reasonably good correlation between the information recorded separately by the observers. These observations also checked fairly closely with ground surveys.

Jack Pine Mortality Study

To determine the extent of jack pine mortality in the budworm infested area, the Milwaukee Forest Insect Laboratory of the Bureau of Entomology and Plant Quarantine, in cooperation with the U. S. Forest Service, conducted a timber drain survey on the Huron National Forest. The objectives of the survey were: "(1) to determine the accumulative current losses in the merchantable stand and in reproduction; and (2) to determine the losses following two seasons' defoliation of varying intensity; that is, the losses that occurred when a light, medium or heavy defoliation was followed by a defoliation of the same or different intensity."

A report of the findings of this survey are being prepared by D. M. Benjamin of the Milwaukee Forest Insect Laboratory. It is planned to re-examine the permanently established plots in 1950 and in subsequent years to obtain a long-term picture of the effects of the infestation.

Larch Casebearer

Early in June, collections of twigs containing larch casebearer cases were made by District Foresters at 22 points scattered throughout the entire state and forwarded to Frank Webb at the University of Michigan Forestry summer camp. Mr. Webb, working on a study of the casebearer in

the Lake States, was interested in hatching these pupal cases in an effort to determine what distribution had been attained by an introduced parasite released near Ann Arbor in 1937.

Word received from Mr. Webb in September indicated that the parasite, Agathis pumilus (Ratz.), had been reared from all the samples taken in the Lower Peninsula, as well as near St. Ignace, Michigan, and Jefferson County, Wisconsin. A total of 279 male and 936 female parasites recovered from these samples were subsequently released near Elmwood in Iron County.

Oak Wilt Disease

An aerial survey of the southern two tiers of counties, plus Allegan and Barry, and excepting Wayne and Monroe, was made in July for the purpose of locating trees infected with oak wilt immediately following its positive diagnosis in Michigan. Using a Conservation Department plane, 13 counties were surveyed in 35 hours flying time at a cost of \$251 for plane and pilot. Berrien, Cass and St. Joseph were flown at two-mile intervals, and the rest at four-mile intervals, at altitudes of 1200 to 1500 feet. At this altitude a good check can be made for one-half mile on either side of the plane, and a fair check for another half-mile. Thus the survey in the three southwestern counties flown on two-mile strips gave between 75 and 100 per cent coverage, and the others somewhat less than 50 per cent. County photo-index maps with flight lines drawn on were used in the plane, and tree locations were spotted by a pin prick through the map sheet.

Following the aerial survey, or between flying days, ground checking of observed trees and the collecting of samples was accomplished. It was a simple matter, in most cases, to find the trees on the ground. In many instances, however, dying trees spotted from the air turned out to be windthrown,

lightening struck, or some species other than oak.

Dying oaks reported from areas not covered by the aerial survey were also investigated during the summer. Specimens were cultured by Professor Forrest Strong at Michigan State College, and a total of 33 positive cases of oak wilt were diagnosed. Of those, 25 had been picked up on the aerial survey, the balance discovered on the ground.

An experimental control project on oak wilt was set up on the Proud Lake State Recreation Area near Highland where trenching around an infected tree was done with prison labor, which was working on State Park projects in the area. In addition to trenching between the wilted tree and the next adjacent ones, a second trench was dug beyond the adjacent trees to eliminate the possibility of spread if these were already infected. Trenches were approximately 2-1/2 feet deep, and only wide enough to permit digging.

Laboratory facilities have now been made available at Michigan State College under Professor Strong for diagnosis of oak wilt and Dutch elm disease specimens. (See under Dutch Elm Disease).

How far north the disease extends will be the object of continued aerial survey in 1952.

FOREST TENT CATERPILLAR SURVEY

A forest tent caterpillar egg survey was conducted in Chippewa and Mackinac counties during November by Forestry Division personnel, Forest Service Rangers, and two Foresters of the Kimberly-Clark Corporation. This survey was carried out to gather the data necessary to make an infestation prediction for the 1952 season.

Prior to the actual ground survey, sample plots were located on maps of the outbreak area. These plots were uniformly placed throughout the known

infestation as well as existing roads permitted. The procedure then was to travel to the plot location and fell three codominant aspen trees. The branches were inspected for the presence of caterpillar eggs and all egg masses, old as well as new, were collected and placed in numbered bags. These egg masses later were used for population and parasitism studies. At each plot, an observation report form was filled out to furnish additional plot data.

During the survey, a total of 39 plots were visited, 21 of them on state and private lands, the remainder on National Forest lands. These plots showed an average of 56.6 new egg masses per tree over the major part of the infestation, and 14.0 new egg masses per tree near the 1951 infestation boundary.

During the second week in December, a similar though much less detailed survey was made in the western end of the Upper Peninsula in Marquette, Dickinson, and Menominee counties. A total of 13 plots were taken with new egg masses being found in only three of them: one in the southwestern part of Marquette, one in the north central part of Dickinson, and one in west central Menominee county.

The outlook for 1952, based on parasite studies and these egg surveys, is for another heavy infestation in the eastern end of the Upper Peninsula with lesser degrees of injury in the other population centers.

A detailed report on "The Forest Tent Caterpillar in Michigan" was prepared at the request of the State Legislature, and additional copies were distributed by the Forestry Division.

OBSERVATION REPORTS

During the period of insect activity, a total of 1019 reports were received from District Foresters as well as Lansing office personnel. Of

these, 982 reports covered insects on the critical list, with 38 per cent of these being positive reports.

In addition, 57 reports on four of the insects on the critical list were prepared by personnel of the Forest Insect Laboratory in Milwaukee and 18 reports were received from Forest Service personnel.

In total, the second year of the Michigan Forest Pest Detection Program showed an increase of 27 per cent in the number of observation reports taken over 1951. In addition, there was an increase of 24.3 per cent in the number of permanent observation areas established.

DIRECT CONTROL ACTIVITIES

Direct control activities on public forests in Michigan in 1951 were limited to work in National Forest areas. All were accomplished by the U. S. Forest Service in cooperation with the Bureau of Entomology and Plant Quarantine.

1. On the Hiawatha National Forest, 4358 acres of jack pine forests were sprayed by airplane for control of the pine budworm, using an oil spray containing one pound of DDT per gallon of fuel oil. The insecticide was applied at a rate of one gallon to the acre. Subsequent sampling showed a 95 per cent mortality.
2. On the Ottawa National Forest, 900 acres of red pine plantations were sprayed for control of the Saratoga spittlebug. An oil spray containing the mixture listed above was applied by airplane at the rate of one gallon per acre.
3. On the Manistee National Forest, two smaller projects were carried out. One was on an experimental basis on 2 acres of jack pine plantations to study control possibilities of the

white pine weevil. In this project, two different applications were made employing a 25 per cent DDT emulsion diluted with fuel oil to 12.5 per cent and 6 per cent, respectively. Resulting checks showed 86.7 per cent reduction in populations using the 12.5 per cent emulsion and a 53.8 per cent reduction using the 6 per cent emulsion. The second project applied insecticide to 390 acres of red pine plantings to suppress the Saratoga spittlebug. The insecticide employed was a 25 per cent DDT emulsion diluted to 12.5 per cent with fuel oil. This control measure resulted in from 68 to 99 per cent mortality.

Control activities by State agencies were limited to an advisory capacity, answering numerous private requests for information on insect and disease identification and recommending controls where practical.

SILVICULTURAL CONTROL MEASURES

The silvicultural controls to combat the jack pine budworm which were inaugurated in 1950 by the U.S. Forest Service and the Conservation Department were continued, but at this date, the effectiveness of this measure has not had time to materialize. The current populations have shown no signs of decrease as a result of these mature jack pine cuttings primarily because of the magnitude of the prescribed project and because controls of this type are relatively slow in their reactions.

During the 1952 season, the continued harvesting of mature orchard-type, and suppressed jack pine will be stressed.

SUMMARY OF PEST CONDITIONS

CRITICAL INSECTS

Pine Budworm (Choristoneura sp.)

The increase in populations of this insect continued in 1951 with the general infestation showing a shift to the eastward. The center of the population was in the north-east and north-central parts of the Lower Peninsula with Ogemaw county again suffering the heaviest defoliation. Montmorency, Roscommon, Crawford, and Clare counties also recorded severe injury. Lighter degrees of defoliation were found in Presque Isle, Alpena, Otsego, and Delta counties with new outbreaks being reported from the Fife Lake and Pere Marquette State Forests on the western side of the Lower Peninsula. Of the 135 reports, 52 of them were positive and showed 57 per cent of the trees as having defoliation of 40 per cent or more. Over reports of 1950, there was a 15.1 per cent increase in the number of trees infested and a 6.4 per cent increase in the amount of injury. While tree losses in pole-sized trees are still not severe, losses in understory saplings and reproduction are becoming more and more apparent. Surveys of the budworm area and jack pine mortality have been described under "Special Surveys."

Red-headed Pine Sawfly (Neodiprion lecontei)

Field reports show a definite drop in the populations of this insect, particularly in the Lower Peninsula. There were only 24 positive reports in 1951, 19 of them being from the Lower Peninsula. The 5 reports from the Upper Peninsula came from Baraga, Menominee, and Schoolcraft

counties, with the greatest population being in Menominee county. In the Lower Peninsula, Alpena, Benzie, and Lake counties appeared to have the most severe injury. Over 1950 reports, there was an 0.8 per cent decrease in the number of trees infested and a 4.0 per cent decrease in the amount of injury.

European Pine Sawfly (N. sertifer)

Reports of this insect were more complete in 1951 and show this insect in widespread distribution on all 2-needle pines throughout the southern half of the Lower Peninsula. Observation reports indicate Ingham county as having the heaviest infestations. There were 31 reports in 1951, an increase of 21 over 1950. Twenty-seven of these reports were positive and showed up to 40 per cent injury. In comparison to 1950, there was a 1.8 per cent increase in the number of trees infested and a 6.0 per cent increase in the amount of injury in 1951. One encouraging development toward the check of this pest is the discovery by the Canadian Forest Insect Laboratory at Sault Ste. Marie, Ontario, of a virus which is lethal to the larvae. Indications are that the virus is much more effective than insecticides in bringing about control.

European Pine Shoot-moth (Rhyacionia buoliana)

From the 35 positive reports of this insect, its distribution was found to include nearly every county south of Townline 16 in the Lower Peninsula, with the greatest damage occurring in the western half of this area. There have been no reports of this insect further north, its movement being limited by prolonged winter cold. Reports have shown a general decrease throughout the infested area. Compared to 1950, ^{there was} a 13.3 per cent decrease in the numbers of trees infested and a 6.1 per cent decrease in the amount

of injury. Limited control measures have been conducted by private owners in conjunction with Michigan State College. Results of these controls have been very favorable if the insecticides were applied at the proper time.

Saratoga Spittlebug (*Aphrophora saratogensis*)

There was a general increase in population of this insect in previously infested regions, with the exception of the Baldwin District of the Manistee National Forest where intensive control measures have apparently prevented population increases. Three other areas were severely attacked: the southeastern part of Iron county showing up to 60 per cent injury; Montmorency county showing up to 60 per cent injury; Grand Traverse county showing up to 80 per cent injury. Positive reports showing lesser degrees of injury were also received from Kalkaska and Clare counties.

Pine Spittlebug (*A. parallela*)

The twenty-two positive reports of this insect indicate very widespread distribution. Alpena county reports show the most severe injury, with Baraga and Marquette counties also reporting rather heavy infestations. The 1950 infestation in Mackinac county along U. S.-2 still persists. Field observations show that there has been a definite upswing in populations in the southeastern part of the state, particularly on Scotch pine hosts. In comparison to 1950 reports, there was a 7.0 per cent increase in the number of trees infested and a 4.4 per cent increase in the amount of injury.

Larch Casebearer (*Coleophora laricella*)

The population of this insect has greatly increased over 1950 with the main infestations being in the northern part of the Lower Peninsula as

well as in the whole of the Upper Peninsula. In addition, there were two reports from Oakland county. The Upper Peninsula reports the greatest amount of injury - up to 100 per cent in many cases. As compared to 1950, there was a 13.6 per cent increase in the number of trees infested and an increase of 28.4 per cent in the amount of injury. Relief from the damage by this insect may be forthcoming due to parasitism. In 1937, an introduced parasite (Agathis pumilus, (Ratz.)) was released near Ann Arbor. Since that time, this parasite has been recorded throughout the Lower Peninsula and near St. Ignace in the Upper Peninsula. In many areas, this parasite is bringing about control of the casebearer. (See Special Surveys).

Larch Sawfly (*Pristiphora erichsonii*)

There were no positive reports of this insect from state-owned lands or from District Foresters during the past season. There were, however, positive reports entered by the Bureau of Entomology and Plant Quarantine indicating small infestations in Gogebic and Baraga counties. Other information sources indicate that this insect is becoming more numerous.

Anomala Beetle (*Pachystethus obliqua*)

There were 41 positive reports on this insect showing an increase of 1.1 per cent in the number of trees infested and a 3.3 per cent increase in the amount of injury. All of the reports were from the Northern half of the Lower Peninsula with Kalkaska, Crawford, and Wexford counties experiencing the severest injury. The trend seems to be in a westward direction after severe damage during the last few years in the eastern part of the state.

White Pine Weevil (*Pissodes strobi*)

There were 32 positive reports on this insect, all from widely scattered points. Chippewa, Montcalm, Midland, and Bay counties, as well as many plantations in the Manistee National Forest, showed heavy infestations in isolated spots. There was an apparent increase in injury over most of the state in young stands. (See "Insect Control Activities" for a description of an experimental control project on this insect).

Hemlock Looper (*Lambdina fiscellaria fiscellaria*)

Although there were no positive reports from Leelanau county or in other parts of the state, this insect will remain on the critical list.

Miscellaneous Insects

Forest Tent Caterpillar (*Malacosoma disstria*)

After a buildup in 1948-50, this insect reached epidemic proportions throughout the eastern end of the Upper Peninsula, with lighter infestations in the Newberry-Seney area, in Marquette, Dickinson, Menominee, and Delta counties in the Upper Peninsula, and in Presque Isle and Cheboygan counties in the Lower Peninsula.

While this insect was not on the critical insect list at the beginning of 1951, its abundance has necessitated placing it on this list for the 1952 season.

A report of surveys for the Forest Tent Caterpillar is included under "Special Surveys."

Bark Beetles (*Ips* sp., *Scolytus* sp., *Dendroctonus* sp.)

There was a noticeable increase in numbers of this insect in the jack pine areas infested with pine budworm. The resulting increase in

numbers of weakened, decadent, and dead trees will undoubtedly foster further increases in bark beetle numbers during the next few years. For this reason these insects will also be placed on the critical insect list for 1952.

DISEASES

Oak Wilt

The oak wilt disease was positively diagnosed in Michigan in June, 1951, from samples collected in Cass county. Details of the survey which followed and the present situation, are described under "Special Surveys."

Dutch Elm Disease

The following report of 1951 activities in connection with the Dutch Elm Disease Program was prepared by the Bureau of Plant Industry of the State Department of Agriculture:

"During 1951 a total of 74 trees in the Detroit area were positively diagnosed as having Dutch elm disease. This is a much larger number of diseased trees than was found in 1950 when 9 positive cases were reported.* A breakdown of the 1951 finds shows 58 diseased trees in the City of Detroit, nine trees in Grosse Pte., three trees in Grosse Pte. Park, three trees in Grosse Pointe Woods and one in Grosse Isle. The Detroit infections are primarily adjacent to these smaller municipalities and across the Detroit River from Windsor, Ontario. Canadian authorities have found a comparatively large number of diseased elms in that city and adjacent areas.

The Bureau of Plant Industry, Michigan Department of Agriculture, has been working closely with the City of Detroit, the Wayne County Road Commission, and the municipalities immediately east of Detroit in the promotion of an adequate control program. Detroit embarked on a survey and spraying program this past year and plans to expand its efforts during 1952. The municipalities east of Detroit are currently making plans for a cooperative control program as a result of frequent consultation with Mr. Boyer of the Bureau of Plant Industry and with members of the staff at Michigan State College.

A survey for the European Elm Bark beetle was conducted in the southern half of the lower peninsula by Bureau personnel during 1951. This survey was particularly emphasized in counties adjacent to Wayne, Oakland, Monroe, Washtenaw and Lenawee counties, which were previously known to be infested. The survey revealed the presence of beetles in one additional county, namely Genesee.

The closing of the Federal Dutch Elm Disease laboratory at East Orange, N. J., was a severe blow to the project, but a similar laboratory for the diagnosis of Michigan specimens has been established cooperatively by the State Department of Agriculture and the Botany Department at Michigan State College. This laboratory will also process Oak Wilt specimens, and any future suspects of either disease should be sent to Prof. Forrest Strong, Botany Department, Michigan State College."

*Through an error 14 had previously been reported for 1950.

PLANS FOR 1952

Specific plans of the Forest Pest Detection Program for 1952 include the following major projects:

1. Further extension of the system of permanent observation areas in the state forest and farm forest districts.
2. Continuation of the aerial survey for oak wilt in Lower Michigan to determine the northern limits of infection; and a recheck of wilt infected spots discovered in 1951.
3. Continuation of the pine budworm survey with special emphasis on the extent of tree mortality.
4. An aerial survey of forest tent caterpillar defoliation in the Upper Peninsula and northern tip of the Lower Peninsula.
5. Cooperation with private individuals in the form of technical advice on control of the forest tent caterpillar.
6. Detailed forest tent caterpillar egg and parasite surveys.
7. A control project against the Saratoga spittlebug in the Presque Isle State Forest, and possibly on other state areas.
8. Close observation of bark beetle activity in pine budworm areas.

The contribution of the Conservation Department to the program, particularly in the establishment of observation areas, insect surveys, and control projects on state-owned lands will be augmented as a result of the recent employing of a forest entomologist in the Forestry Division.

SUMMARY

Among the major activities of the Michigan Forest Pest Detection Program in 1951 was the increase in the number of permanent observation areas established, and observation reports received, the latter exceeding 1000 for the year.

Three special surveys were conducted; one was an aerial survey of 13 southern Michigan counties in July to locate oak wilt cases following the positive identification of this disease in Michigan; the second was an aerial reconnaissance and ground survey to determine the extent of injury of the jack pine budworm; and the third an egg survey in November to determine the forest tent caterpillar prospects for 1952.

The jack pine budworm infestation continues to spread in the Lower Peninsula with a general shift of the main outbreak to the eastward.

The present situation with regard to the forest tent caterpillar, and the potential danger of bark beetles in the budworm areas, have warranted the placing of those insects on the critical list for 1952.

Oak wilt is definitely established in Michigan with 33 positive cases located, scattered across the lower part of the state. An experimental control project was established on state land in the Proud Lake Recreation Area in Oakland county.

Dutch elm disease survey and control work, as reported by the State Department of Agriculture, continued in the Detroit area with 74 additional diseased trees being found, bringing the total confirmed cases to 83 by the end of the year.

Laboratory facilities at Michigan State College for the diagnosis of oak wilt and Dutch elm disease specimens have been set up by the Botany Department in cooperation with the Bureau of Plant Industry of the State Department of Agriculture.